

## EFFECTIVE IMPLEMENTATION OF LEAN MANUFACTURING IN PT. KALBE FARMA TBK

Prasti Sulanjari and Aries Firman  
School of Business and Management  
Institut Teknologi Bandung-Indonesia  
prasti.sulanjari@mail.sbm-itb.ac.id

*Abstract—Production costs are influenced by the high average value of inventory. Inventory which meant here are the inventory of materials, semi-finished materials inventory and finished product inventory. To cope with the amount of inventory that is high enough, PT Kalbe Farma Tbk implement lean manufacturing in order to obtain the production process that uses the minimum inventory. The purpose of this study was to determine the effectiveness of the implementation of lean manufacturing in PT Kalbe Farma Tbk and its impact. The study uses secondary data methodology which are lead time, the amount of work in process (WIP) and achievement rate. For three times the period of the determination of lead time and the amount of WIP, obtained trend that the lower lead time and WIP, the lower the amount of achievement rate. One cause that is dominant is the absence of a tablet and after visible roots of the problem is caused by unplanned breakdown. Appropriate to principles of Toyota Production System and Operational Excellence, the basis of the application of lean manufacturing is a system of production, including production machinery, need to be stable. According to Liker, when engine often stops, management needs to think to implement Total Productive Maintenance (TPM). TPM involves all employees of all levels to maintain engine performance.*

**Keywords :** Lean Manufacturing, Lead Time, WIP, Achievement Rate, Total Productive Maintenance

### I. INTRODUCTION

In 1966, the six brothers headed by Doctor Boenjamin Setiawan, Ph.D., better known as Doctor Boen and Fransiscus Bing Aryanto Boen had a dream to help the people of Indonesia to be more concerned with the health and welfare of their lives. Therefore, they decided to build a business called Kalbe that focus on business in the pharmaceutical field. Beginning the business was carried on its founding garage in North Jakarta, and has developed over 40 years to be one of the largest pharmaceutical company in Southeast Asia. PT Kalbe Farma Tbk has become a public company since 1991 in the Indonesia Stock Exchange with market capitalization currently over U.S. \$ 1.4 billion and sales of more than 9 trillion rupiahs. Kalbe which is headquartered in Jakarta, is the largest pharmaceutical public company in Southeast Asia with the largest market in 9 countries with total population

reached 570 million. Kalbe Group has a product or service which is divided into four major categories, namely prescription drugs (perscription pharmaceuticals), medical products (consumer health), nutritional products (Nutritionals) and distribution business.

### II. BUSINESS ISSUE EXPLORATION

In the analysis of PT Kalbe Farma weakness there are two important points that become the focus of the company which are inventory controls and operating expenses are quite high. In the Figure 1, two points are to be concern in the overview of reported performance of PT Kalbe Farma each year.

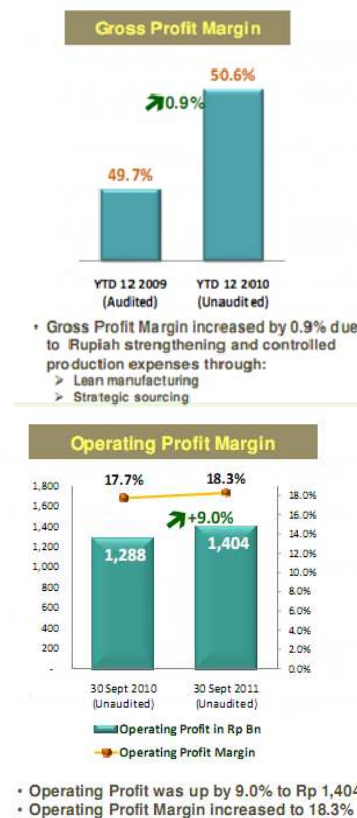


Figure 1 Overview of PT Kalbe Farma Performance 2009-2010

Gross profit margin is a measurement of the efficiency of distribution and production processes of a company. Gross profit margin is calculated from the difference in profit with the cost of goods sold (COGS) divided by profit. Operating profit margin is a measurement of the amount of profits which a company after deducting variable costs of production. Operating profit margin is calculated from the operating income divided by total profit. At the company's performance measurement there are two components to the attention of the COGS and operating expense. In Figure 1, lower gross profit margin and operating profit margin indicates that the value of COGS and operating expense are quite high. COGS is influenced by days of inventory (DOI) while the operating expense is affected by the production cost and administrative cost. DOI is calculated from the average inventory divided by COGS per day. Average inventory includes raw materials inventory, work in process (WIP), finished goods, inventory and distribution inventory. Production costs consist of direct labor, indirect labor, inventory carrying costs, equipment depreciation, and the material used in the production process. Inventory carrying cost is the cost to carry inventory. Operation Excellence is the winning goals of PT Kalbe Farma Tbk. Operation Excellence is therefore key to achieving the vision of the company that is passionately drive toward sustainable growing pharmaceutical company enabled by innovation, operation excellence, and a one-culture competent leaders. The points of excellence include the operation of high value added operations (effective and efficient operation), Kalbe lean and agile systems and risk management. Lean manufacturing is carried out by Kalbe called Lean System (KLS). KLS goal is high quality, low cost and low lead time.

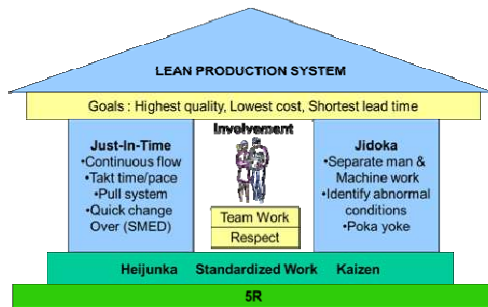


Figure 2 Kalbe Lean System

Implementation of lean manufacturing on Line 1 has been started since July 2009 up to now. This study aims to look at the effectiveness of the implementation of lean manufacturing to the optimization of production processes in order to reducing production costs and increase productivity. In addition, to investigate the side effects, if any, of implementing lean manufacturing at Kalbe.

#### A. Conceptual Framework

The study focused on the production process flow in Line 1. Implementation of lean manufacturing in the production process flow realized in the form of changes in value stream mapping to get one batch flow. Lean implementation effectiveness is then

measured with the data lead time, the number of WIP and achievement rate. Data obtained from the average lead time per month from the stage of material weighing up to release FG. Achievement rates were derived from the achievement of monthly production. A more detailed research framework can be seen in Figure 3.

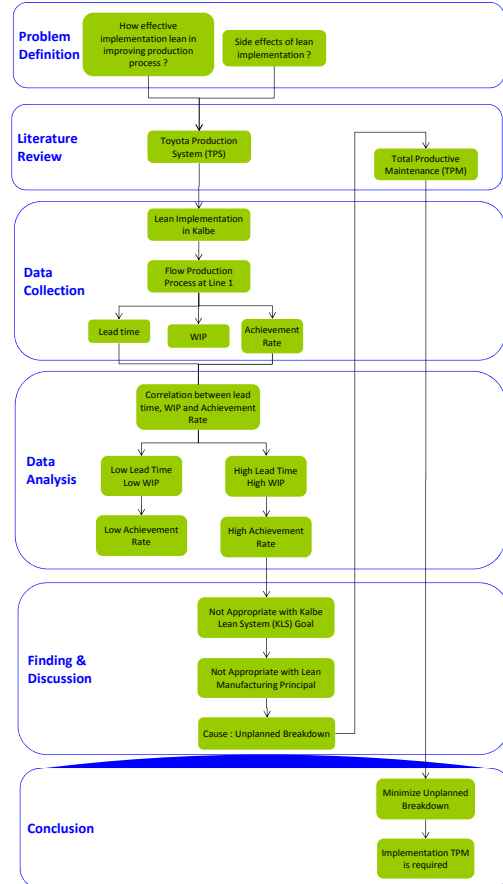


Figure 3 Research Framework Analysis of Lean Manufacturing at Line 1

#### B. Method of Data Collection and Analysis

The data taken to determine the optimization of production processes in Line 1 consists of lead time, the number of WIP and achievement rate. Measurement of lead time on Line 1 starts from the process of weighing the material up to the release of FG. The data can be viewed in Figure 4 and Table 1.

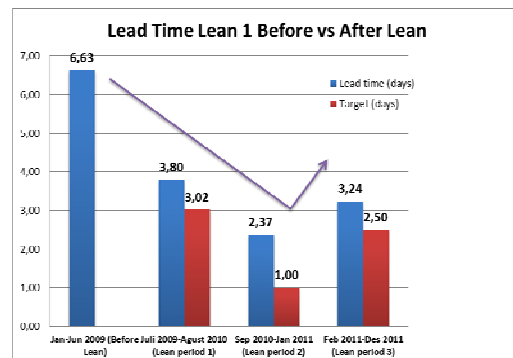


Figure 4 Lead Time Line 1 Before and After Lean Implementation

Table 1 Trend Lead Time, WIP and Achievement Rate July 2009-Dec 2011

Kategori	Periode		
	Jul 2009-Aug 2010	Sep 2010-Jan 2011	Feb-Dec 2011
Lead time (hari)	3,02	1	2,5
WIP (batch)	22	7	17
Achievement rate	88,93%	63,44%	94,93%

In Figure 5 and 6 can be seen the influence of lead time and WIP of achievement rate. The lower lead time and WIP, then the lower the achievement rate is achieved, and vice versa. It can be concluded lead time and WIP that interfere with the achievement of low rate.

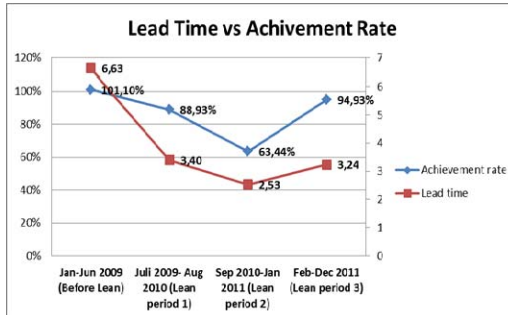


Figure 5 Impact of Lead Time to Achievement Rate

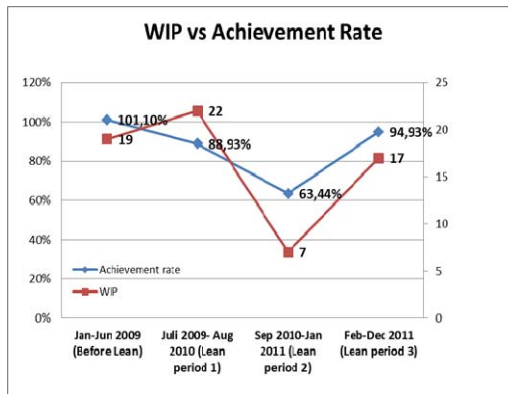


Figure 6 Impact of WIP to Achievement Rate

### C. Analysis of Business Situation

Problems arise when WIP was reduced to 7 batches affect the achievement rate has decreased by 28,66%. From pareto diagram of the causes of decline in achievement rate, found there are three main issues, namely:

- 1.Wait kanban, root cause: the quarantine FG has not been releases
- 2.Wait release, root cause: there is a problem in the process
- 3.No tablet, root cause: unplanned breakdown

The third problem is unplanned breakdown became the focus of attention in this study because it is part of the production process flow. If WIP is maintained as much as 7 batches it will affect the fulfillment of each month FG as illustrated in Figure 7.



Figure 7 Illustration Unplanned Breakdown Machine on Achievement Rate

With high WIP, when the machine is defective granulation, printing and packaging machinery still get input. Not surprising that there is an increase of 50% achievement rate for WIP plus 142%. Thus, it can be concluded that the Line 1 tolerate unplanned breakdown problems with increased WIP. An increase in WIP is not in accordance with the principles of the Toyota Way to reduce inventory as step raises inefficiencies and problems. Damage to the machine becomes an obstacle when the company tried to implement one batch flow. Toughness is required in each track machine to anticipate the flow stops when one machine breaks down.

### III. BUSINESS SOLUTION

In TPS, lowering the water level of inventory will bring problems to the surface (Liker, 2006). Similarly, faced by PT Kalbe Farma Tbk, after lowering the amount of WIP into 7 batches, the problems emerged, as shown in Figure 8. Decrease in the amount of lead time and WIP turns out to impact the achievement rate. The lower the amount of lead time and WIP, the lower the achievement rate is achieved. Problems that arise and are associated with the production process is unplanned breakdown.

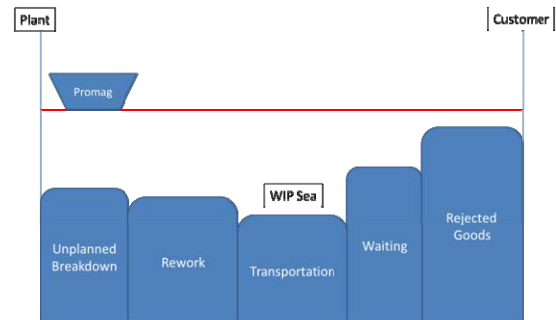


Figure 8 Emerging Issues-WIP 7 batch

#### A. Alternative of Business Solution

TPS is described as a system that is structured like a house. A house will be strong if it has a foundation, a strong pillar and roof (Liker, 2006). A foundation described as a stability. In lean manufacturing, with a set amount of WIP as low as possible, if one machine stops then the other machines will also stop. It will thus lead to a crisis so that there is a sense of urgency to resolve the problem so the machine can run immediately. If the problem is often unplanned machine breakdown occurs, it may be time to invest in the management of Total Productive Maintenance (TPM), in which all people learn to clean, inspect, and maintain the machine (Liker, 2006).



Figure 9 TPS House

JIT as a pillar of the TPS house, not only eliminate waste but also the variability. Variability will arise when the inventory level, in this case the amount of WIP, is derived. One cause of variability is a machine that does not work according to standards. Unplanned breakdown as one of the real variability effect on the achievement rate. This situation affects the profitability of the company because it can not meet customer needs and maintenance costs are quite high. Necessary to resolve maintenance and reliability strategy to maintain the performance of a machine. Maintenance and reliability strategy in accordance with the principles of JIT and the engine can cope with variability is Total Productive Maintenance (TPM) as presented by Liker.

#### B. Analysis of Business Solution

TPM is productive maintenance carried out by all employees through small group activities. TPM, which organizes all employees from top management to production line workers, is a companywide equipment maintenance system that can support sophisticated production facilities (Nakajima, 1988). Goals of TPM adalah zero breakdowns dan zero defects. If the breakdowns and defects can be eliminated, it can improve equipment operation rates, lower costs, minimize inventory and increase employee productivity.

TPM has a goal to eliminate the six big losses, which are directly eliminate the waste according to the core of the TPS. To achieve zero breakdowns, TPM promotes defect free production, just in time production, and automation. It is safe to say that without TPM, the Toyota Production System could not function (Nakajima, 1988). TPM is one solution to reduce unplanned breakdown.

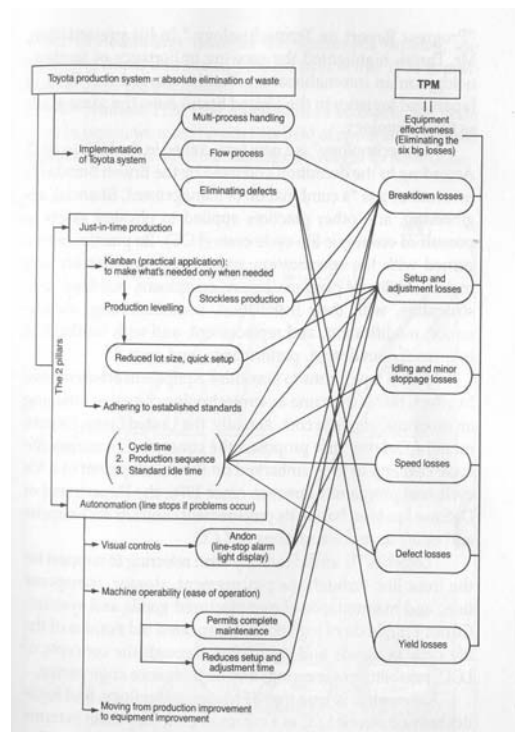


Figure 10 Toyota Production System and TPM (Nakajima, 1988)

TPM can eliminate the losses that one of them caused by machine breakdown. It can be concluded, with the implementation of TPM can solve problems of unplanned breakdown and KLS goal to reduce lead time and WIP amount can be achieved.

#### IV. CONCLUSION AND IMPLEMENTATION PLAN

The initial goal of the lean was not achieved due to lead time and WIP amount of targeting is not in accordance with the optimization of production processes with a view to improve the achievement rate. Achievement rate decrease caused by unplanned breakdown. TPM can eliminate losses due to machinery breakdown which appeared in the production process flow. With the implementation of TPM, unplanned breakdown is expected to be reduced so that the achievement rate remained high with lower lead time and WIP amount.

TPM combines the conventional practice of preventive maintenance with the concept of total employee involvement. The result is an innovative system for equipment maintenance that optimizes effectiveness, eliminate breakdowns and promotes autonomous operator maintenance through day to day activities. Specifically, TPM aims at :

1. Establishing a company structure that will maximize production system effectiveness
2. Putting together a practical shoofloor system to prevent losses before they occur, throughout the entire production system's life cycle, with a view to achieving zero accidents, zero defects and zero breakdowns
3. Involving all departments, including production, development, sales and management

4. Involving every single employee, from top management to front line workers
5. Achieving zero losses through small group activities

Here are a technique to implement the principles of TPM:

1. First principle : At this stage analyzed the conditions that lead to engine breakdown and improvement plan so that the machine can work effectively in accordance with the initial conditions
2. Second principle : Establish an autonomous maintenance program
  - a. Initial cleaning: operators understand the procedures of cleaning and inspection
  - b. Causes and countermeasures for the effects of dirt and dust: looking for the cause of the dirt and dust as well as search engine cleaning procedure more faster
  - c. Cleaning and lubricating standards: creating a standard time for cleaning, lubricating and tightening
  - d. General inspection: form a team to inspect the machine at regular intervals using a standard line with TPM policies and targets that have been made previously
  - e. Autonomous inspection: at this stage to do the coordination between production and maintenance departments related to the inspection standards to avoid overlapping
  - f. Organization and tidiness: 5R implementation specific for the production area
  - g. Full implementation of autonomous maintenance: a focus on the removal of six losses and improvement in each team
3. Third principle : Set up a scheduled maintenance program for the maintenance department
4. Fourth principle : Conduct training to improve operation and maintenance skills
5. Fifth principle : Develop an early equipment management program`

TPM implementation starts with the formation of a team that includes five principles of TPM which are continuous improvement, preventive maintenance, autonomous maintenance, continuous skill development (training & development), and early equipment management. TPM team organizational structure is shown in Figure 11. Time table of TPM implementation plan can be viewed on Table 2.

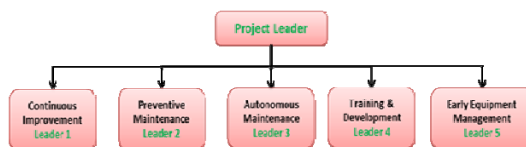


Figure 11 TPM Team

Table 2 Time Table Implementation TPM

Principle	Stages	PIC	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12
Continuous Improvement	Identification causes for losses	Leader 1					
	Improvement in OEE	Leader 1					
Preventive Maintenance	Improved planned	Leader 2					
Autonomous maintenance	Initial cleaning	Leader 3					
	Countermeasures at the sources of the problems	Leader 3					
	Cleaning & lubrication standards	Leader 3					
	General inspection	Leader 3					
	Organization & tidiness	Leader 3					
	Full autonomous maintenance	Leader 3					
Training & Development	Continuous skill development	Leader 4					
Early Equipment Management	Create effective designs	Leader 5					

## ACKNOWLEDGMENT

This paper is written based on the author's final project at MBA ITB supervised by Mr Aries Firman, who has been relentlessly motivating the author to accomplish the final project. The author would like to thank you PT Kalbe Farma Tbk where the final project has taken place.

## REFERENCES

- Aquilano, Chase, Jacobs, 2009. Operations & Supply Management, Twelfth Edition. McGraw Hill International Edition.
- Heizer, Render, 2006. Operations Management, Eight Edition. Pearson International Edition
- Hunger, Wheelen, 2010. Strategic Management and Business Policy : Achieving Sustainability, Twelfth Edition. Pearson Education Inc.
- Kennon, Josh. Investing Lesson 4 - Analyzing an Income Statement. Available from. <http://beginnersinvest.about.com/>
- Liker, 2006. The Toyota Way – 14 Prinsip Manajemen dari Perusahaan Manufaktur Terhebat di Dunia, First Edition. Penerbit Erlangga.
- McCharty, Willmot, 2001. TPM: A Route to World Class Performance, First Edition. Butterworth-Heinemann.
- Nakajima. S, 1988. Introduction to TPM. Total Productive Maintenance, English Translation Edition. Productivity Press Inc.
- The Digital Resource of Pharmaceutical Manufacturing Magazine, 2010. Operational Excellence: Pharma's Missed Opportunities, 2010. Available From : <http://pharmamanufacturing.com/articles/2010/042.html>
- Website Kalbe Farma, 2011. Company Update : Unaudited YTD September 2011 Results, October 2011. Available From : <http://kalbefarma.com>
- Website Kalbe Farma, 2011. Annual Report 2011, 20 Mei 2011. Available From : <http://kalbefarma.com>